



Credit: uusc4all/Haiti Es6r/CC BY-NC-ND 2.0

Haiti Digital Agriculture Assessment

A report for USAID/Haiti

March 2022



Table of Contents

List of Acronyms	4
Executive Summary	6
Supply Side Recommendations	7
Demand Side Recommendations	9
Introduction	11
Purpose of Assessment	11
Haiti Agricultural Overview	11
Digital Ecosystem and Trends in Haiti	12
Digital Infrastructure and Adoption	12
Digital Governance	13
Digital Economy	14
U.S. Global Food Security Strategy and Digital Focus	15
Methodology	15
Desk Research and Key Informant Interviews	15
Limitations	16
Digital Enabling Factors in Haiti	16
Connectivity	16
Digital Financial Services	19
Literacy & Mobile Phone Adoption	20
Digital Agriculture Service Providers	20
Key Trends and Findings	20
Haiti-Focused Digital Agriculture Service Providers	21
Global Cloud-Based Digital Agriculture Solutions	24
Adoption of Digital Tools in Agriculture	25
Key Trends and Findings	25
Advisory Demand Side Usage	26
Definition	26
Usage	26
Challenges	27
Supply Chain Management	27
Definition	27
Usage	27
Challenges	28
Finance	28
Definition	28

Usage	29
Challenges	31
Conclusion & Recommendations	32
Supply Side Recommendations	33
Demand Side Recommendations	34
Annexes	37
Annex 1: Database of Stakeholders	37
Annex 2: Relevant Taxonomies by Organization	39
Annex 3: Key Informant Interview (KII) Question Sets	41

List of Acronyms

ACME	Action pour la Coopération avec la Micro Entreprise
AgTech	Agricultural technology
AVANSE	Appui à la Valorisation du Potentiel Agricole du Nord, Pour la Sécurité Économique et Environnementale
BNC	Banque Nationale de Crédit
BNDA	Banque Nationale de Développement Agricole
CICO	Cash in and cash out
CONATEL	Conseil National de Telecommunications
DECA	Digital Economy Country Assessment
DFS	Digital financial services
ERP	Enterprise Resource Planning
FDA	United States Food and Drug Administration
FtF	Feed the Future
FONHDAD	Haiti Foundation for Sustainable Agricultural Development
HDS	Haiti Drone Services
HRASA	Haiti Resilience and Agriculture Sector Advancement Activity
IADB	Inter-American Development Bank
IPs	Implementing Partners
IVR	Interactive voice response
ITU	International Telecommunications Union
KIIs	Key informant interviews
LAC	Latin America and Caribbean
MARNDR	Ministry of Agriculture, Natural Resources and Rural Development

MFIs	Microfinance Institutions
MIDAS	Candio Michaud & Co.
MPCE	Ministry of Planning and External Cooperation
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration's
OAS	Organization of American States
P2P	Person to Person
PSDH	Haiti's Strategic Development Plan for 2030
SaaS	Software as a service
SFA	Smallholder Farmers Alliance
SHFs	Smallholder farmers
SIA	Strategic Impact Advisors
SIMA	Système d'Information sur les Marchés Agricoles/Agricultural Market Information System
Suomi NPP	Suomi National Polar-orbiting Partnership
ToT	Training of trainers
VIIRS	Visible Infrared Imaging Radiometer Suite

Executive Summary

This report provides an overview of the digital agriculture ecosystem in Haiti to inform future USAID/Feed the Future (FtF) programming that supports the advancement and adoption of digital agriculture tools in the country. In pursuit of this objective, Strategic Impact Advisors (SIA) conducted desk research and key informant interviews (KIIs) to better understand the digital agriculture products and services available in the market, as well as their current and potential usage.

The availability of digital agriculture tools in Haiti is limited, with only one identified Haitian-born and operated agricultural technology (AgTech) company, Agriledger. There are other Haitian-owned and operated technology providers that innovate for the agriculture sector, but most of them do not see the creation of agriculture specific technologies as a primary product offering. The majority of agriculture technology solutions available in the market were catalyzed by donor funding and Haitian technology providers do not perceive these innovations as worthy investments if they are not in the context of an international development project.

The most popular digital agriculture tools available are farmer database management systems, which allow field agents or extension agents to collect data on farmers including demographic data, GPS coordinates, crop type, sales information and other such information. These solutions are typically used in the context of international development projects where agribusinesses are trained on using the technology to improve production efficiency, support traceability and develop farmer digital identities. Drone services are also frequently used by agribusinesses to delimit plots, assess the health of plants and understand irrigation needs. Given the insecurity in Haiti, drones are an important tool to grant agribusinesses visibility while minimizing risk. Drones have contributed to a demonstrable increase in production according to the agribusinesses engaged as part of this assessment.

Use of global software solutions such as WhatsApp, Microsoft Excel (non-cloud version) and weather websites and applications are the most common digital tools used among the agribusinesses engaged. Like most other sectors globally, WhatsApp is used to manage field communications, directly reach farmers with smartphones and facilitate quick communication between colleagues. Microsoft Excel is frequently used to manage farmer databases while weather applications and websites are used to assess sowing times and irrigation needs.

The core challenges in delivering digital agriculture tools in Haiti are a consequence of weaknesses in the digital ecosystem's building blocks. Weak connectivity around the country, particularly in rural areas where farmers work and live, restricts the capacity of farmers to use these services. Haiti has the second lowest number of mobile phone subscriptions in the Latin America and Caribbean (LAC) region, with only 61 out of 100 people with a subscription (Cuba

is last with only 59 out of 100).¹ Digital and digital financial literacy also present barriers for agricultural actors, particularly farmers, in making productive use of agricultural technology products and services. Mistrust in digital financial services (DFS) and a limited digital payment ecosystem restrict the large-scale use and adoption of services like mobile money.

With these challenges in mind, as well as the objectives of the recently launched USAID FtF Resilience and Agriculture Sector Advancement Activity (HRASA), SIA framed the below recommendations around two primary categories: 1) supply side and 2) demand side.



Supply Side Recommendations

Recommendation 1: Transition Agriledger to a Sustainable Business Model

Support Agriledger in designing a software as a service (SaaS) business model where users can participate in the system prior to an exchange of funds and pay at the end of the transaction for use of the system.

Why: Currently, Agriledger is one of the few Haitian grown technology companies focusing solely and exclusively on the agricultural sector. Its distributed ledger technology increases profit margins for farmers by giving them a percentage of the final sale price at export in addition to the local market price. However, Agriledger remains reliant on donor funding and is interested in understanding how it can shift to a more sustainable business model.

How: Provide technical support to Agriledger in 1) customer segmentation to better understand who its paying customers could be as well as 2) supporting the development of a SaaS business model.

Who: Agriledger and USAID Implementing Partners (IPs) of ongoing USAID activities.

Relevance: Agriledger's goal is directly aligned with Objective 1 of the HRASA to improve market system efficiency by linking all relevant market actors including smallholder farmers (SHFs), logistics companies and exporters to improve profit margins through distributed ledger technology.

Recommendation 2: Leverage an E-Marketplace for Smaller Farm Associations

Provide technical assistance to support farmer associations in boosting sales through e-commerce.

Why: Smaller farm associations in Haiti lack the visibility and online presence needed to attract customers from across the country. They are often limited to buyers they know within their personal networks.

¹ <https://data.worldbank.org/indicator/IT.CEL.SETS.P2?locations=ZJ>.

How: Leverage an existing e-commerce platform such as espaceAgro.com or maketpamht.com to link associations with potential buyers. Payment for goods can be made through mobile money or bank transfer. This would involve technical assistance to the associations on digital literacy and capacity building, marketing their produce effectively on the e-commerce platform and conducting measurement and evaluation for a period of six months to assess its impact.

Who: Partnership with an e-commerce platform, associations and buyers (i.e. supermarkets, wholesalers and Madam Saras).

Relevance: This recommendation directly relates to Objective 1 of the HRASA to increase market system efficiency by better linking value chain actors as well as Objective 2 to increase private sector investment and engagement by creating sustainable linkages between market actors in the value chain.

Recommendation 3: Pilot Solar Powered Cold Storage with a Digital Request and Payment Feature

Pilot solar powered cold storage facilities that farmers can book space for via a USSD menu, SMS or phone call and pay for through mobile money.

Why: One of the biggest constraints to fruits being eligible to export in Haiti is the lack of cold storage, with produce often spoiling before it is exported.

How: Pilot a project in collaboration with a solar company to design innovative and sustainable solutions for solar powered cold storage facilities for tropical fruits. Farmers could make requests to book space at the cold storage facility digitally through SMS, USSD or phone call with daily rates deducted from their mobile money accounts. Alternatively, a microfinance institution (MFI) could participate in this project under a warehouse receipt system and provide credit to the farmers for the cold storage with repayment made following the sale of produce. Another option could involve a collaboration with Agriledger and an MFI, where repayment for the cold storage is taken out of the farmers' commission on the final export price and Agriledger sends it to the MFI directly.

Who: This pilot could involve an avocado or mango producing association that works directly with SHFs, solar technology providers such as Enersa, Sigora Haiti, Jebtech or Enertex, a partnership with MonCash, NatCash and/or a technology company to create the digital request system and an MFI and/or Agriledger, depending on the preferred method of payment.

Relevance: This relates directly to Objectives 1 and 2 of HRASA to increase market system efficiency and to increase private sector investment and engagement across market systems. More specifically under Objective 2, it supports the sustainable linkage between market actors including SHFs, logistics companies and exporters to improve the efficiency and profitability of the tropical fruit value chains.



Demand Side Recommendations

Recommendation 1: Support Digital Transformation of Agribusinesses

Support the digital transformation of agribusinesses to respond to the pending U.S. Food and Drug Administration (FDA) rule for the digital tracking and tracing of key imports including tropical fruits and nut butters.

Why: The U.S. FDA is likely to pass a rule in 2022 that aims to standardize the data elements and information that agribusiness companies must establish and maintain to improve the tracking and tracing of food for both domestic and imported produce and products. This law will require maintaining digital records of key data elements associated with critical tracking events along value chains including 1) growing, 2) receiving, 3) transforming, 4) creating and 5) shipping. Included on this list are key exports for Haiti to the U.S. including tropical tree fruits such as mangoes and nut butters. With this new requirement, Haitian agribusinesses must be able to respond to information requests from the FDA within 24 hours. This means that agribusinesses must have the digital capacity to respond to these requests.

How: Matchmake agribusinesses to business development services organizations that expose agribusinesses to digital tools and services that allow for traceability and certification. In addition, provide technical support through an Implementing Partner (IP) to train the agribusinesses' team on how to use the technology and monitor and evaluate their success for six months. Depending on the standards set by FDA, digital solutions that support the digitization process can be as basic as a suite of free cloud-based services such as Google Suite or Office 365.

Who: Business development service organizations that typically work with agribusinesses and USAID activities. Digital services deployment experts from either third party providers or digital traceability service providers themselves (e.g. FarmForce or Agriledger).

Relevance: This relates directly to Objective 1 of HRASA to increase market system efficiency. This initiative can contribute to improving the value of annual sales of producers and firms as well as improving agribusinesses' access to technology.

Recommendation 2: Digitize Value Chain and Digital Financial Literacy Training

Why: MonCash and NatCash are already used by associations for receiving payments for produce, but it is not being used to pay farmers. Associations indicated that bulk cash payments increase the risk of kidnapping and it would be safer to pay farmers through MonCash or NatCash. However, farmers are hesitant to receive payments digitally, mostly due to mistrust around mobile money. Digitizing farmer payments will reduce security risks for

farmers while also supporting the digital record keeping of these smaller associations, which remain largely analog.

How: The best way to introduce new digital solutions is through existing networks of trust. The association management brings strong community relationships with their farmers. A USAID IP could offer technical assistance to guide the associations through the bulk payment process as well as conduct a training of trainers (ToT) for facilitating digital financial literacy. SIA developed a [series of tools](#) for integrating digital financial literacy into FtF programming, which includes rubrics for disseminating digital financial literacy content through trusted community leaders.

Who: Farmer associations (the Haiti Mission has an extensive list of these already) and the SHFs they work with, as well as an IP that can provide ToT support.

Relevance: This recommendation aligns with Objective 3 of HRASA to increase household and community ability to recover from shocks and stresses through a digital financial literacy campaign that can sensitize farmers on savings and access to financial services.

Recommendation 3: Build on Système d'Information sur les Marchés Agricoles/Agricultural Market Information System (SIMA) to Offer Additional Farmer Information Services

USAID's 2013-2020 project, Appui à la Valorisation du Potentiel Agricole du Nord, Pour la Sécurité Économique et Environnementale (AVANSE), included the development of a mobile-based market information system accessible via interactive voice response (IVR), SMS and a web platform called SIMA in collaboration with the Ministry of Agriculture, Natural Resources and Rural Development (MARNDR) and Digicel. We recommend building on this existing platform, currently limited to market prices, to also offer weather information. Furthermore, we suggest delivering information through radio as well, which is widely used by farmers and would increase its reach.

Why: Delivering weather predictions to farmers is one of the most commonly cited needs of agriculture associations and agribusinesses. This information can help inform when to sow seeds and when to irrigate. With an increasingly unpredictable climate, having access to good weather forecasts (e.g. on rainfall predictions) is proving essential to maximizing production in Haiti.

How: Build on the existing SIMA initiative to also offer weather information and other extension services to farmers through the existing SMS and IVR channels, and scale to include delivery through radio. This could involve continuing the partnership with the MARNDR and Digicel as well as partnering with FONHDAD or Centre National d'Information Geospatiale (both governmental research agencies) to curate additional content.

Who: Continue AVANSE's partnership with Digicel and MARNDR and partner with local radio stations.

Relevance: This is directly related to Objective 1 under HRASA to increase market system efficiency by improving access to market-based research and extension as well as information to build a more productive value chain.

Introduction

Purpose of Assessment

The objective of this assessment is to support USAID/Haiti in better understanding the country's digital agriculture landscape to inform its current and forthcoming FtF activities. The recently launched FtF HRASA Activity prioritizes three objectives: 1) increased market system efficiency, 2) increased private sector investment and engagement across the market system and 3) increased household and community ability to recover from shocks and stresses.

The assessment examines Haiti's digital agriculture ecosystem, taking into consideration the supply side actors and demand side usage of digital agriculture tools and services. The primary goal of this report is to provide USAID/Haiti and its IPs with relevant and realistic recommendations to help strengthen the quantity and quality of digital agriculture services and products available in Haiti, as well as increase the awareness and usage of these services and products. Recommendations are intended to inform program opportunities for the ongoing FtF activity.

Haiti Agricultural Overview

Agriculture is the largest sector of the Haitian economy, employing more than half of the country's labor force, but only representing 18% of the country's GDP.² The agricultural sector's contributions to the economy has declined since 1980, with Haiti currently importing about 60% of the food that it consumes.³ Primary export crops cultivated in Haiti include vetiver, for which Haiti supplies over half of the world's vetiver oil, as well as cocoa and mangoes. Two-thirds of all Haitians depend on the agricultural sector and practice small subsistence farming, which is highly vulnerable to natural disasters.⁴ Subsistence farmers focus on the production of crops such as sugar cane, cassava, plantain, banana, corn, yams, sweet potatoes and rice. For almost 20 years, Haiti has ranked 3rd on the Climate Risk Index.⁵ Lack of water remains a critical problem for Haitian farmers and agribusinesses. More than 85% of the country's watersheds are degraded, causing complications in managing irrigation needs with increased flooding and less groundwater storage.

² <https://ihsi.ayiti.digital/public/images/documents/1641409910.pdf>.

³ <https://www.ifad.org/en/web/operations/w/country/haiti>.

⁴ <https://www.cia.gov/the-world-factbook/countries/haiti/#economy>.

⁵ https://germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021_2.pdf.

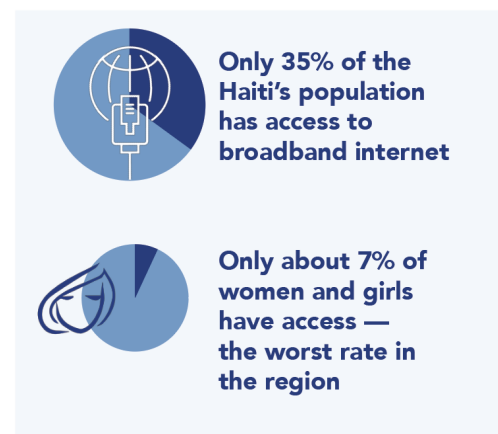
The Haitian smallholder farmer is the dominant agriculture player in Haiti, however, agricultural data on the number and characteristics of SHFs is sparse. According to the co-founder of the Smallholder Farmers Alliance (SFA), there are as many as 1 million SHFs in Haiti.⁶ Relationships between agribusinesses and SHFs tend to be filled with mistrust, with SHFs historically viewing agribusinesses as “getting rich off of their backs,” according to the CEO of a Haitian AgTech.⁷ Due to this mistrust, value chains tend to be fragmented and involve a number of actors before produce is sold, processed or exported. More research on Haitian SHF needs, habits and preferences is necessary to ultimately understand the types of services that are most suitable to them.

Digital Ecosystem and Trends in Haiti

Although a USAID [Digital Economy Country Assessment \(DECA\)](#) has not been completed in Haiti, a key summary of Haiti’s digital ecosystem framework with consideration of the larger global digital ecosystem can be found below.

Digital Infrastructure and Adoption

The lack of affordable and reliable internet connectivity remains a key barrier to inclusive digital growth in Haiti. Mobile subscription costs are significantly higher for the average Haitian customer than in other countries in the region — a 1GB subscription can cost as much as 4% of per capita income.⁸ Only 35% of the Haitian population has access to the internet, lagging far behind the regional average of 78%.⁹ Only about 7% of women and girls in Haiti have access to the internet — the worst rate in the region.¹⁰



Haiti’s Mobile Connectivity Index falls significantly behind that of neighboring countries. Taking into account infrastructure, affordability, consumer readiness and content and services, Haiti scores at 32.81, nearly 30 points below the LAC region’s index score of 60.76. Affordability receives the lowest score at 24.22, while consumer readiness scores the highest at 54.6, still well below the LAC region’s scores. As of January 2021, there were 7.37 million mobile subscriptions in Haiti, equivalent to 64.3% of the total population.¹¹ Between 2020 and 2021,

⁶ <https://www.lidehaiti.org/crisistoopportunity>.

⁷ KII with Agriledger.

⁸ <https://www.worldbank.org/en/news/opinion/2020/12/14/more-than-just-internet-harnessing-the-digital-economy-to-rethink-the-future-in-haiti>.

⁹ <https://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=HT>.

¹⁰ <https://www.worldbank.org/en/news/opinion/2020/12/14/more-than-just-internet-harnessing-the-digital-economy-to-rethink-the-future-in-haiti>.

¹¹ <https://datareportal.com/reports/digital-2021-haiti>.

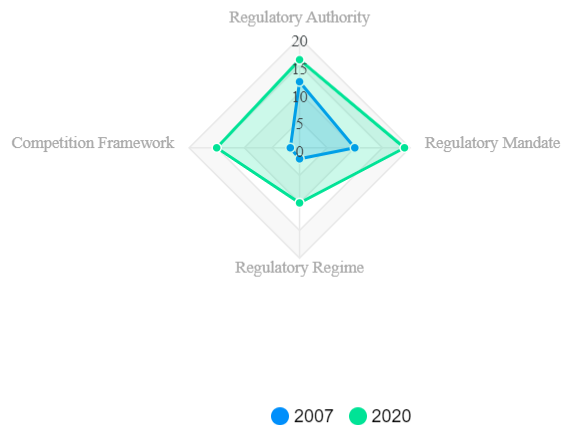
mobile subscriptions in fact saw a 3.1% increase.¹² Mobile broadband penetration remains low, at 32%.

Digital Governance

Haiti’s digital infrastructure is regulated by the Conseil National de Telecommunications (CONATEL). As the regulatory body for the digital ecosystem, CONATEL’s key functions include regulating the telecommunications industry, leading the country’s national telecommunications provider, Télécommunications d’Haiti S.A.M, and overseeing and implementing programs in the development of the telecommunications sector.¹³ The minority state-owned (40%) telecommunications operator is owned in partnership with Viettel (a telecommunications company headquartered in Vietnam) to form National Telecom S.A, commonly known as Natcom. The Caribbean-based Digicel is the other telecommunications provider in the country with the majority market share.

The International Telecommunications Union (ITU) has an ICT regulatory tracker that measures changes taking place in the ICT regulatory environment of countries around the world. Haiti has a relatively low score for the LAC region, with 60/100 compared to the region’s average score of 72/100. ICT regulation has, however, grown with ICT infrastructure in Haiti, as seen in the graphic below, which observes the country’s ICT Regulatory Tracker score in 2007 and 2020.¹⁴

ICT Regulatory Tracker 2007-2020, Haiti



Source: ITU

In partnership with the World Bank, the Government of Haiti launched a Digital Acceleration Project in 2020 aimed at connecting 2.7 million more people to the internet and making digital infrastructure more resilient in the face of disasters. The project targets ICT infrastructure, ICT

¹² Ibid.

¹³ <http://www.conatel.gouv.ht/sites/default/files/DecretCreationCONATEL27Septembre1969.pdf>.

¹⁴ <https://app.gen5.digital/tracker/country-cards/Haiti#regulatory-regime>.

services and public administration of ICT development. Haiti's Strategic Development Plan for 2030 (PSDH) also includes 32 development programs, with one focusing on the expansion of communications and digital infrastructure in the country, and calls for private sector actors to invest.¹⁵ The PSDH was released in 2012 by the Ministry of Planning and External Cooperation (MPCE), and although a web page with progress and information on program implementation was planned, this web page is nowhere to be found.¹⁶ Implementation of territorial development programs were to be monitored and led by the MPCE, however, their shared information on the plan is quite minimal.

Haiti does not have any legislation that directly addresses data protection, nor does it have any authorities monitoring and enforcing penalties for data breaches. Although the Government of Haiti has ratified international treaties regarding human, civil and political rights from the UN and Organization of American States (OAS), the government has not adopted any legislation protecting citizens' right to privacy.¹⁷ The only law relative to digital governance is the law recognizing the validity of digital signatures to facilitate e-commerce transactions.

Digital Economy

Digital economy, as defined by the digital ecosystem framework, takes into consideration things like ICT talent and skills, e-commerce and DFS. The below highlights important aspects of the Haitian digital economy.

ICT Talent and Skills. The population of Haiti scores 2.71/7 in digital skills, well below the regional average of 3.53/7 and lower than all other countries in the region. There has in fact been no improvement in the country's score over the past three years, but rather a decrease.¹⁸ This World Bank scale determines ICT skills based on data from the World Economic Forum's Global Connectivity Index to measure to what extent the active population possesses sufficient digital skills (e.g. computer skills, basic coding, digital reading). While anecdotal, during interviews of supply side stakeholders for this landscaping assessment, most interviewees stated that ICT professionals were easy to find; however, two interviewees identified challenges due to brain drain and high training and retention costs.

E-Commerce. Due to Haiti's limited connectivity and energy infrastructure, e-commerce growth in the country is slow.¹⁹ The preference for cash payments also further limits e-commerce growth. Only 6.9% of people over 15 years of age own a credit card and only 8.5% of the

¹⁵http://observatorioplanificacion.cepal.org/sites/default/files/plan/files/Haiti_PLAN_STRAT%C3%89GIQUE_de_developpement_tome1.pdf.

¹⁶ <https://www.mpce.gouv.ht/index.php/psdh>.

¹⁷ <https://www.alterpresse.org/spip.php?article26420>.

¹⁸ https://tcdata360.worldbank.org/indicators/hb0649ed2?country=HTI&indicator=41400&viz=line_chart&years=2017,2019&compareBy=region.

¹⁹ <https://www.trade.gov/country-commercial-guides/haiti-ecommerce>.

population purchases or pays bills online.²⁰ Aside from Amazon, AliExpress and eBay, large and accessible e-commerce platforms are non-existent in Haiti.

DFS will be covered in more detail in the following sections.

U.S. Global Food Security Strategy and Digital Focus

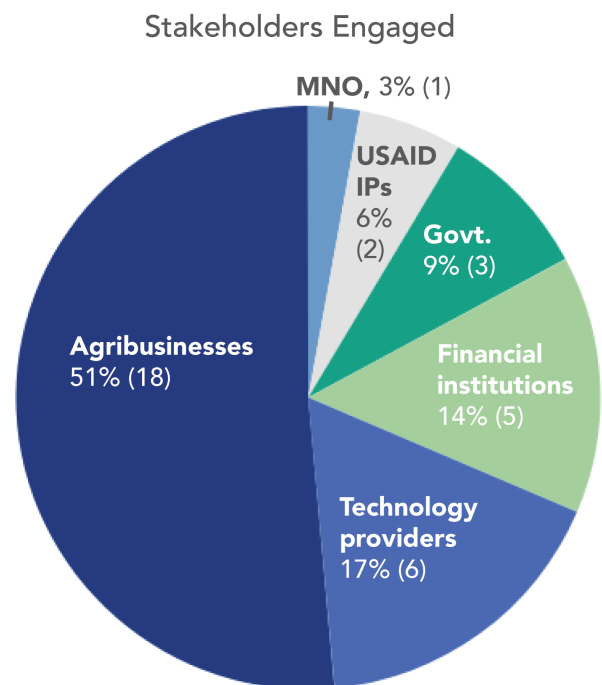
USAID’s recently released [U.S. Global Food Security Strategy 2022-2026](#) aimed at ending global hunger, poverty and malnutrition includes more consideration of digital tools and technologies than the Agency’s previous strategy. The current strategy calls for greater use and integration of digital technologies and tools, as well as greater investments in these tools as a part of future FtF programming. SIA has taken these goals into consideration and provided realistic and practical recommendations that can be applicable to forthcoming USAID/Haiti activities.

Methodology

Desk Research and Key Informant Interviews

SIA commenced the study with desk research reviewing online resources on the digital and agricultural sectors in Haiti. In October 2021, SIA sent an online survey and KII invitations to 55 different demand and supply side stakeholders including agribusinesses, technology providers, USAID IPs, financial institutions, other development organizations, government agencies and mobile network operators. Created and distributed via SurveyMonkey, the survey asked respondents to describe their use and/or development of digital agriculture tools from the demand and supply side, respectively. SIA received 16 responses to the survey: 10 from the supply side and six from the demand side.

KIIs were held remotely in accordance with COVID-19 health and safety protocols and due to the political and security risks in Haiti following the aftermath of President Jovenel Moïse’s assassination. Between October 16, 2021 and December 23, 2021, SIA conducted 35 KIIs with organizations using remote



²⁰ <https://datareportal.com/reports/digital-2021-haiti>.

conferencing. A structured interview format was adopted for the majority of interviews, focusing on details of the digital tools interviewees used and/or developed. The list of interviewed organizations can be found in Annex 2 and the interview question sets can be found in Annex 3.

Limitations

Most of the information in this report is self-reported by users, developers and owners of digital tools. SIA had limited ability to independently verify the information, so it is important to acknowledge that some responses could be skewed. In particular, digital tool developers may be overrepresenting their reach so as to promote their tool, either to capture more users or funders, or as part of a general goal to promote their organization. It is also possible that demand side KII answers are skewed, as tool owners are likely to give numbers for the more active, positive users. SIA took this possibility into account when analyzing demand side feedback.

The threat of violence and kidnapping in Haiti in addition to a four-week lockdown instated to reduce the threat of COVID-19 restricted our ability to conduct KIIs. We received fewer responses to our invitations for interviews than anticipated, particularly from government agencies.

Digital Enabling Factors in Haiti

Connectivity

There are two telecommunication operators in Haiti, Digicel and Natcom, which are regulated by the Haitian telecommunications authority CONATEL. Digicel is the market leader in mobile subscriptions, with approximately 70% market share and 4 million subscribers.²¹ Natcom follows with 30% market share as of 2019.²² The two providers offer a range of coverage options from 2G to LTE; the government allowed LTE in 2019 through a \$300 million license.²³

Download speed data provided by Speedtest indicates that broadband speeds across Haiti are uneven, with higher speeds concentrated in the department of Ouest, which is the department that hosts the capital, Port-au-Prince, and has the highest population density. Even within this department, there is a significant presence of black pixels in the map, which represent areas with slower download speeds. Additionally, the majority of the areas with internet coverage in the less populated departments have slower download speeds. The lack of high speed internet across the country limits the ability of residents to easily access and use the internet, as their

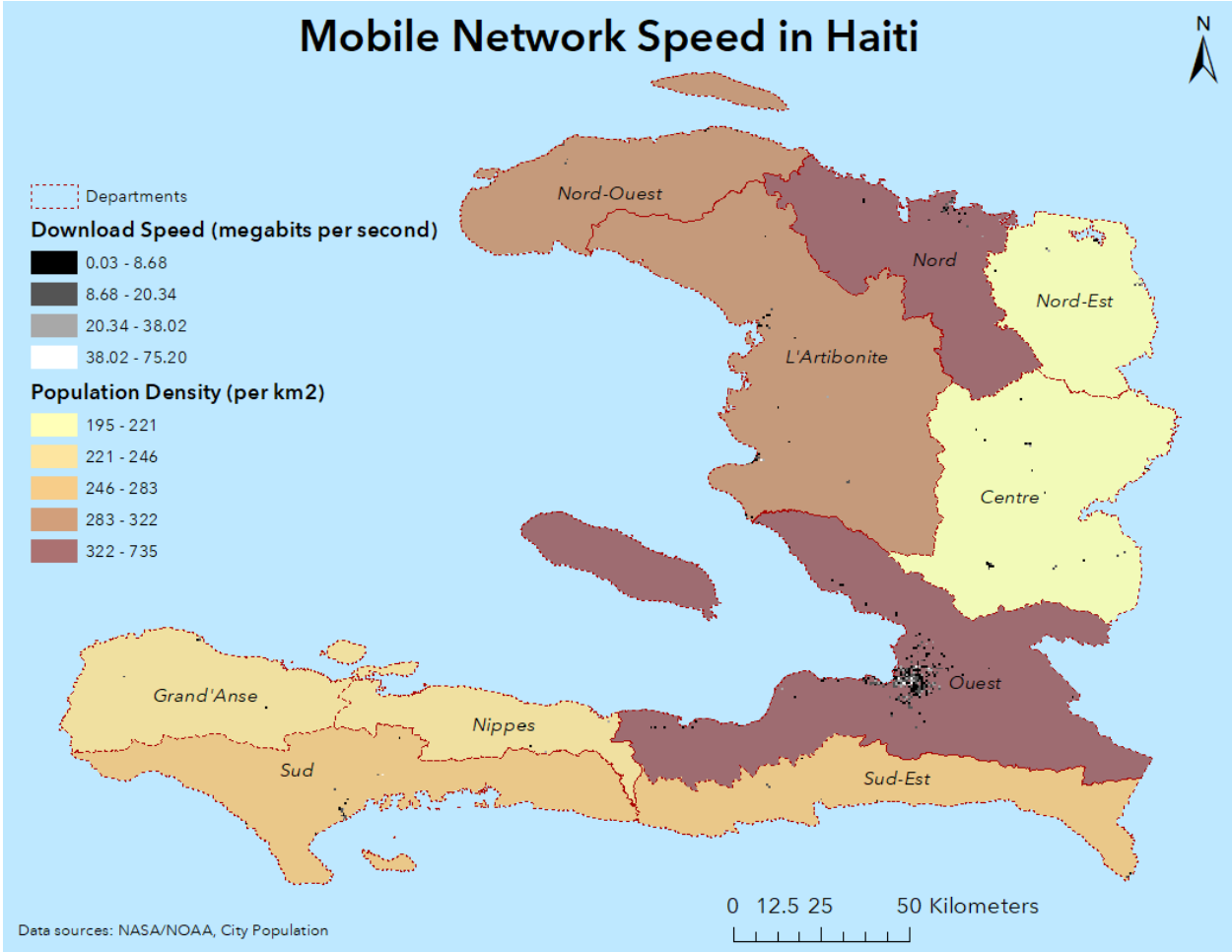
²¹ KII with MonCash.

²² <http://viettelglobal.vn/globals/haiti-1.html>.

²³ <https://developingtelecoms.com/telecom-business/telecom-regulation/9044-4g-licences-to-cost-us-300m-in-haiti.html>.

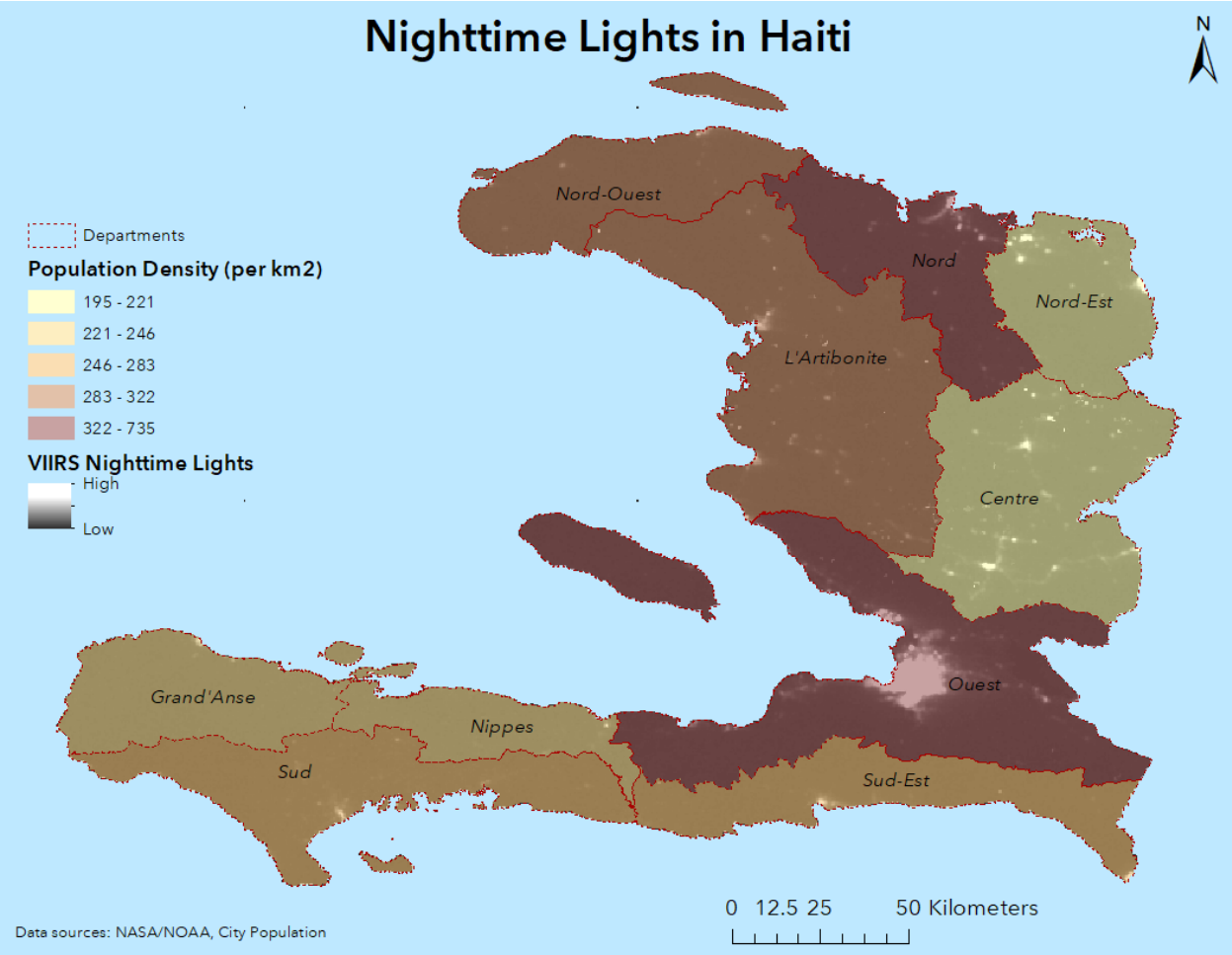
connection may be interrupted or insufficient enough to support products and services that require fast and reliable connectivity.

The speed of mobile networks in Haiti follow a similar pattern as broadband speed. Coverage pockets with higher download speeds are largely limited to the department of Ouest. Ouest also has a significant presence of coverage pockets with slower download speeds, as do departments outside of Ouest. This lack of fast mobile network speed, coupled with the inadequate broadband speeds, puts residents living outside of the western part of Ouest at a connectivity disadvantage, as they may not be able to use products that need a reliable and fast connection.

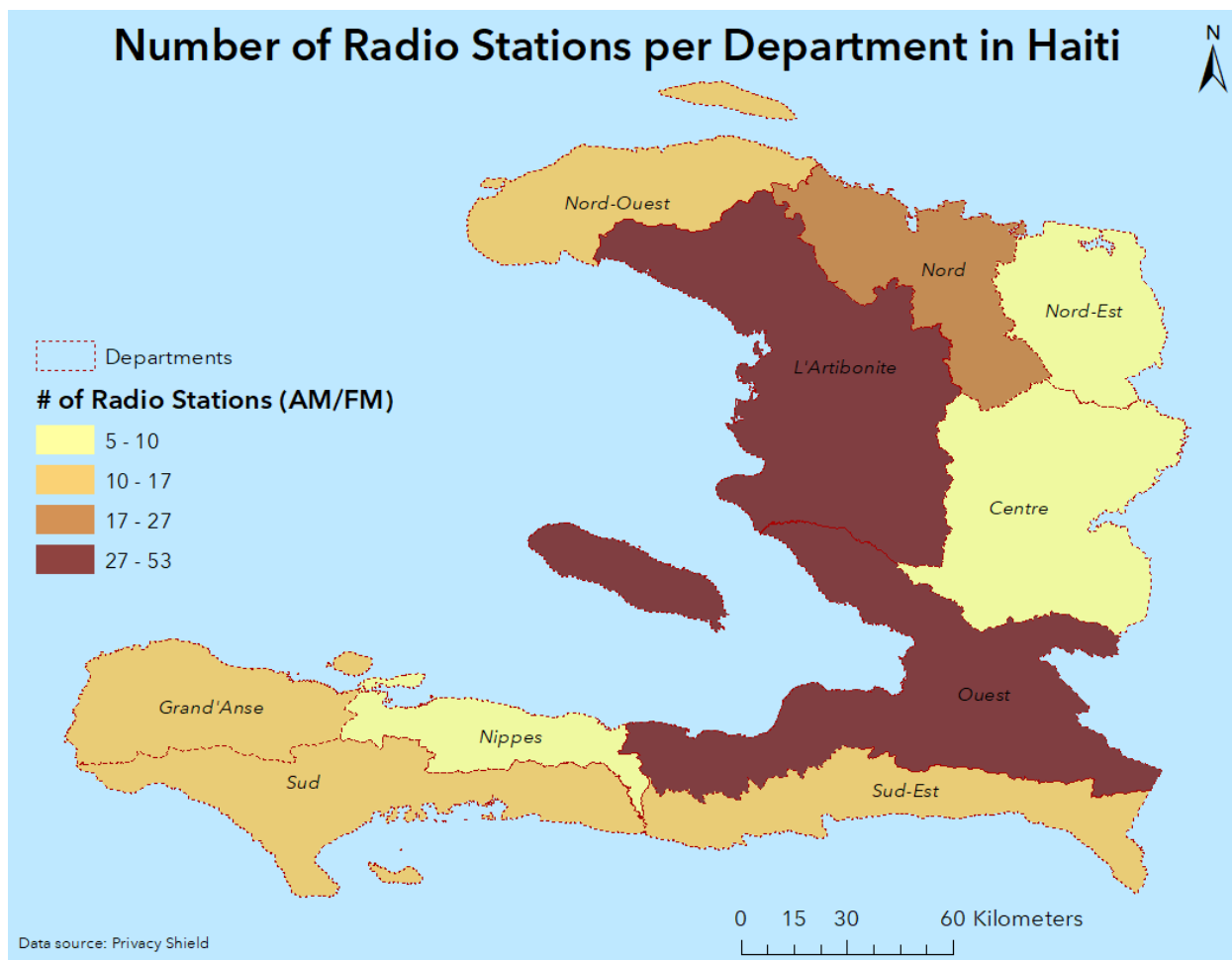


The Visible Infrared Imaging Radiometer Suite (VIIRS) instruments, aboard the joint National Aeronautics and Space Administration (NASA) and National Oceanic and Atmospheric Administration’s (NOAA) Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, measure nighttime lights daily. Data collected from VIIRS are used in various applications, such as measuring the connectivity of an area, assessing the electrification of rural towns, or

mapping a country’s economic activity hotspots. In this map of nighttime lights in Haiti, nighttime lights, as indicated by white pixels, are heavily concentrated in the highly populated department of Ovest. Departments with lower population densities, in the southern part of the country, have a limited presence of nighttime lights, suggesting that these areas could be experiencing lower levels of connectivity or access to electricity. The distribution of nighttime lights could indicate that people in the southern and less populated departments have more difficulty accessing and using products and services that require electricity, such as mobile phones and computers.



These connectivity constraints complicate the delivery of digital agriculture tools, especially considering most farms are located in rural areas where connectivity is worse than it is in urban areas. Radio presents a more compelling opportunity to reach Haitian farmers, given many farmers already use the radio and radio signals are stronger than cellular ones.



There are roughly 200 legal commercial, religious and independent radio stations in Haiti, 53 of which are located in Ouedes. All departments in Haiti have at least five radio stations, with the majority (eight departments) having 10 or more radio stations. Even departments with large rural populations have a significant radio station presence, such as L'Artibonite with 47 AM/FM stations. Overall, this map demonstrates that radio is a consistently available medium of communication across the country, allowing residents in both urban and rural areas to access broadcasted information.

Digital Financial Services

There are two mobile money operators in Haiti: NatCash, offered by the mobile network operator Natcom, and MonCash, offered by the mobile network operator Digicel. MonCash is the tenured market leader, with NatCash only launching its services in December 2021. MonCash's core use cases are Person to Person (P2P) payments and cash in and cash out (CICO) services. MonCash's other services include bill pay and merchant payments. MonCash piloted insurance and microcredit, but deemed the latter too risky and the former did not

perform well in the pilot.²⁴ Lack of CICO access points and weak merchant payment adoption outside of urban and peri-urban areas often leave rural customers like farmers with little options to cash out or spend their mobile money. This could be a contributing factor to the historical and current distrust that many farmers have of mobile money services and the strong preference for physical cash.²⁵ The clear market dominance of MonCash leaves little incentive for innovating or offering additional value added services available in other mobile money markets. With the introduction of a competitor, this may change.

Literacy & Mobile Phone Adoption

Digital financial literacy and digital literacy remain crucial barriers to the adoption of digital services, particularly for farmers. Recognizing this digital gap for the farmers that they work with, many agribusinesses and AgTechs use technology that ends at the extension level or uses basic features like SMS. Mobile phone adoption is also a constraint for farmers, with many relying on the mobile phones of their family members or cooperative leaders to use digital services.²⁶ Low smartphone adoption coupled with poor connectivity also restricts the capacity of agribusiness and AgTechs in distributing more engaging content, such as video tutorials through WhatsApp, while also limiting farmers' ability to access the internet and instant messenger services.

Digital Agriculture Service Providers

Key Trends and Findings

There are only two Haitian-based technology companies that innovate specifically for the agricultural sector: Agriledger and Haiti Drone Services (HDS). Other technology providers that innovate for the agricultural sector do so almost exclusively in the context of donor-funded projects, many of them funded by USAID. These companies, such as Papyrus and Solutions S.A., do not view innovating for agriculture as a core feature of their businesses and expressed minimal interest in innovating for the agricultural sector in the absence of donor funding. Even Agriledger (one of the only AgTechs in Haiti), born out of a hackathon, is heavily reliant on donor-funded money to sustain its operations.

The primary reason these companies do not see any commercial benefit in developing agricultural technologies is the low willingness of agribusinesses to pay for services themselves. There is a perception among technology providers that agribusinesses or agriculture-oriented organizations will only be incentivized to adopt and introduce digital tools if the cost is covered. There is also a fear, based on historical experience, that after the project funding

²⁴ KII with MonCash.

²⁵ KIIs with Agribusinesses.

²⁶ KIIs with Agribusinesses.

period ends, the agribusiness will be unable to sustain the costs of the technology, which will then fall on the technology provider.

The most popular types of digital agriculture tools offered are data collection services that allow agribusinesses or agriculture-oriented organizations to collect data on their farmers, production levels, yield and market prices. Beyond services provided by local companies, there are a number of free foreign software that are actively used by agribusinesses in Haiti, such as Field Area, Windy and Google Maps and Earth. Microsoft Office Suite is the only paid software used across the agribusiness engaged for this assessment. Only one agribusinesses, Acceso, pays for a digital value chain integration and transparency tool, called Farmforce.

In the sections below, the services offered by Haitian-operated technology providers are highlighted, followed by descriptions of how broader digital agriculture tools are currently being used by agribusinesses.

Haiti-Focused Digital Agriculture Service Providers

Name:	Haiti Drone Services	Provider Type:	Digital Agriculture Provider
# of Clients:	20 agribusinesses/companies	Value Chain Focus:	Agnostic
Overview of Service:	HDS provides aerial footage and photography to agribusinesses. It can provide identification and exact measurement of production areas, measure the available plant cover, identify areas with production problems, identify the state of health of the plants and detect the rate of chlorophyll of the plants.		
Key Challenges:	The primary barrier HDS faces in scaling its business is the connectivity requirements to operate the drone, which needs a minimum 3G connection. HDS was used by an agribusiness engaged as part of this assessment, however that agribusiness had to discontinue its use of the services because of the cost implications. While HDS offers a powerful solution, especially to map and plan agronomic spaces, the network connectivity constraints make it a difficult solution to scale in rural frontier contexts.		

Name:	Agriledger	Provider Type:	Digital Agriculture Provider
# of Clients:	3,000 farmers	Value Chain Focus:	Agnostic
Overview of Service:	Agriledger is a Haitian AgTech that uses blockchain technology to create digital farmer identities by tracking production and sale history. Agriledger also sends farmer information services through SMS and supports access to credit through the digital farmer identities in partnership with financial service providers. Agriledger documents each stage along the value chain, from the farmer's first sale of produce to export and final sale. Its model aims to improve transparency in supply chains to: 1) reduce the capacity for middlemen to exploit farmers and 2) fetch higher revenue for farmers by exporting produce and paying them a percentage of the final sale price. It is worth noting that Agriledger does not work directly with agribusinesses; its services have only been used in the context of donor-funded projects. Agriledger launched its solution in Haiti through a pilot sponsored by the World Bank. Agriledger connects actors across the value chain		

	<p>including farmers, transporters/logistics providers and exporters. The graphic below offers an overview of the farmer facing user experience when using Agriledger.</p> <div style="text-align: center;"> </div> <p>With this model, Agriledger claims it can return 68% of revenue to the farmers, while 32% goes to the service providers that support the transport and export of the produce (logistics, exporters, etc.).²⁷ Agriledger also sends farmer information services through its platform, via SMS, in partnership with a content provider. Agriledger does not develop its own credit scoring criteria, however the blockchain data that Agriledger collects is used by financial service providers as a basis for credit scoring.</p>
Key Challenges:	High costs to maintain the platform and strong reliance on donor funding.

Name:	Papyrus	Provider Type:	International Development Project
# of Clients:	N/A	Value Chain Focus:	Developed solutions for sorghum and maize
Overview of Service:	Papyrus is a project management company that also designs its own technology in the context of donor-funded projects. Papyrus developed an application to collect data on SHFs with the goal of creating a farmer database for the USAID SMASH project in collaboration with Brana, a local beer company owned by Heineken. However, due to COVID-19, the project did not continue and Papyrus has indicated that it is unclear whether Heineken will assume the costs of the technology moving forward. The application is far from being available off the shelf and requires active funding to refine and operate. From this application, Papyrus created two other applications for different projects with PISA and MAIS, two agribusinesses.		
Key Challenges:	The app developed for PISA was tested, but is not fully functional yet due to issues with the software, which Papyrus is addressing. USAID is providing funding to maintain the cost of the application, but PISA is unsure if the app is sustainable post-project funding. Papyrus was quick to admit that developing agriculture technology is not its core use case and it's wary of doing so again. Some of the key challenges that it has faced include cost and visibility of data and understanding how to monetize the app.		

Name:	Solutions S.A.	Provider Type:	International Development Project/Technology
-------	----------------	----------------	--

²⁷ KII with Agriledger.

			Provider
# of Clients:	3,000 including cooperative associations, agribusinesses/exporters, and the Ministry of Agriculture	Value Chain Focus:	Mangoes, cocoa, coffee, vetiver
Overview of Service:	Solutions S.A. is an ISO compliant technology company that develops solutions for the agricultural sector, though it is not its primary use case. It developed a traceability app for USAID's FtF project for the mango sector that supports cooperative associations in selling mangoes and conducting traceability with 6,000 Francisque mango producers. The traceability system uses GIS and mobile phone technology to track the origin of mangoes sold to exporters and uses a zip code system to identify areas of production. The app can collect economic, gender, localization and demographic data. More specifically it can collect information related to crops, sowing, harvesting and selling as well as data on certifications and traceability. The app integrates with MonCash, allowing organizations to issue payments to farmers through the application. Field agents collect information using the application on tablets and mobile phones and that data is uploaded to their server, managed by Solutions S.A. This solution is still being used by the MARNDR, and Solutions S.A. is bearing the cost of maintaining the app.		
Key Challenges:	Its technology often requires at least three days of intensive staff training, and there is a learning curve for staff that are not technologically savvy.		

Name:	The Heifer Foundation	Provider Type:	International Development Project
# of Clients:	3,000 Haitian farmers	Value Chain Focus:	Vetiver
Overview of Service:	The Heifer Foundation is implementing a project with Inter-American Development Bank (IADB) to create digital solutions for the vetiver value chain. Currently under implementation, the project seeks to improve the lives of 3,000 Haitian farmers by bringing together all actors in the vetiver value chain to optimize its traceability and ensure that a fair remuneration is paid to SHFs. Farmers receive a program specific ID card with a QR code, ID number and their photograph. This card is linked to additional data on the farmer, such as demographic and location. The platform can track and capture data across the vetiver value chain stages including plot data, planting, projections for optimal harvesting, actual harvesting dates, pick-up and delivery schedules, prices, sales and more. The platform uses GIS mapping, aerial imaging, weather data and drone technology to monitor progress, yields and harvest.		
Key Challenges:	Project implementation recently began, so no key challenges have been identified yet.		

Name:	Haiti Foundation for Sustainable Agricultural Development (FONHDAD)	Provider Type:	Non-profit Research Organization
# of Clients:	N/A	Value Chain Focus:	Agnostic
Overview of Service:	FONHDAD is a non-profit research organization and autonomous association that supports the modernization of Haiti's agricultural sector through new techniques and technologies. FONHDAD previously used SMS to disseminate content around weather, market prices and pesticide application, but discontinued this service due to the cost of sending SMS. Now it relies exclusively on WhatsApp and Facebook to send this content.		
Key Challenges:	Since discontinuing SMS, FONHDAD's content has not been accessible to farmers without a smartphone nor to farmers without connectivity.		

Name:	Extensio	Provider Type:	Technology Provider
# of Clients:	1 agribusiness (Acceso)	Value Chain Focus:	Peanuts, citrus, mangoes, moringa, castor oil, sisa, moringa
Overview of Service:	While Acceso is an agribusiness, it has also designed its own proprietary field extension service application called Extensio. Extensio acts as a digital field agent and disseminates value chain specific weather insights and advisory services to SHFs through SMS, WhatsApp and a call center. Extensio also delivers video content and tutorials for farmers through WhatsApp.		
Key Challenges:	Farmers must have access to a smartphone to receive the more engaging WhatsApp content.		

Name:	MonCash	Provider Type:	Mobile Money Operator
# of Clients:	1.5 million active	Value Chain Focus:	N/A
Overview of Service:	<p>MonCash is overwhelmingly the provider of choice for making digital payments in Haiti. It offers a bulk payment solution that takes approximately one week to open and requires the entity issuing the bulk payments to open a separate and dedicated bank account that can be used to convert funds into e-money. Users can issue the bulk payments themselves by uploading an Excel or CSV file of the intended beneficiaries with names, phone numbers and transaction values, or MonCash can make the payments on behalf of organizations after receiving the same Excel or CSV file. MonCash does not offer insurance, savings or microcredit through its platform. Microcredit was in the works, but it was deemed too risky to pursue. Insurance was being tested in partnership with an insurance provider, but the early customer feedback and uptake was not encouraging enough to invest significantly in expanding this service. MonCash has a total of 2 million users in Haiti, of which 1.5 million are active (meaning they used the solution within the last 30 days). MonCash offers two types of wallets:²⁸</p> <p>A mini wallet account:</p> <ul style="list-style-type: none"> - Remote registration, not required to visit a store or agent - Restricted balance to 10,000 Gourdes/\$USD100 - KYC requirements include name and date of birth <p>A full wallet:</p> <ul style="list-style-type: none"> - Limit of 75,000 Gourdes/\$USD750 - Must register at a Digicel regional office, select Digicel stores or MonCash Agents - Completed Registration form - Two copies of valid ID 		
Key Challenges:	MonCash does not offer value added services such as insurance or microcredit. Its CICO agent network is also limited in reach, particularly in rural areas where farmers are located.		

Global Cloud-Based Digital Agriculture Solutions

Windy. Windy is an application available on Android, iOS and the web that provides information on precipitation, wind and other weather conditions.

²⁸ <https://www.digicelgroup.com/ht/en/moncash/customer.html>.

Google Earth and Maps. Google Earth and Maps are Android and iOS applications that use GPS, satellite imagery and aerial photography to offer 360-degree panoramic views of land. Google Earth renders a 3D representation of Earth, primarily based on satellite imagery, which can help inform topography.

WhatsApp. The popular instant messaging application offered on Android and iOS, owned by Meta.

Microsoft Office Suite (non-cloud based). Excel is the most popular tool used by agribusinesses to manage farmer databases.

Google Forms. A cloud-based survey software offered by Google that integrates with Google Sheets and offers instant analysis on responses.

Field Area. Field Area is an application that can be downloaded on Android or iOS for area, distance and perimeter management. It allows users to measure fields, mark specific points of interest and share maps with other users. The app uses GPS technology to conduct the mapping.

Farmforce. Farmforce is a Norwegian AgTech with a suite of digital tools designed to monitor inventory, manage field activities, track progress along the supply chain, survey plots, control the planting and production cycle and have visibility on activities on the ground. Farmforce does this through web-based and mobile apps that can be used by extension agents to collect data on farmers during registration as well as throughout the harvesting cycle. This application is available offline. Traceability solutions are designed by assigning farmers a unique ID which is linked to the GPS location of their farm and is attached to purchase information through a barcode-based system. The only identified agribusinesses using Farmforce in Haiti is Acceso.

Adoption of Digital Tools in Agriculture

Key Trends and Findings

The use of digital tools by agribusiness and agriculture-oriented organizations in Haiti is strongly favored towards Microsoft Office Suite, WhatsApp, MonCash, Google Maps and Earth as well as drone services. Most larger agribusinesses maintain farmer databases using Microsoft Excel and communicate with extension or field agents through WhatsApp. These larger agribusinesses make use of drones to delimit plots, assess irrigation needs and determine the health of plants. Smaller farm associations facilitate more direct relationships with farmers than larger agribusinesses. They are often community-focused businesses (some operating informally) that are highly analog. Farmer databases, if they exist, are paper-based, and communication with farmers is done through phone calls or in-person visits. Computers are

scarce with these smaller associations but smartphone penetration and literacy is high. The farmer associations do make use of MonCash to receive payments from buyers who are not within their community, but payments to farmers occur in cash.

Acceso stands out as the most digitally-enabled agribusiness in Haiti, making use of digital farmer database management technologies, digital farmer information services and cloud-based technologies to map farmer plots. Most of the other agribusinesses engaged still adopt manual and analog methods of data collection on farmers through field agents. Many agribusinesses also cited concerns around cost in regards to the use of digital technologies and a preference for donor organizations to subsidize those costs. Some even had to discontinue the use of digital technologies that were beneficial because budgets could not support their continued use.

This section categorizes the different types of digital technologies being used by agribusinesses, farmers and other agriculture-oriented organizations by applicable taxonomy.

Advisory Demand Side Usage

Definition

Advisory services are defined as digitally delivered information on good agricultural practices, pest and disease management as well as market and weather insights. This use case can also include tailored and farmer specific digital services or software that allow farmers to make informed decisions to improve their harvest and yields, improve their quality of production and maximize their revenue. In Haiti, the primary observed sub-use cases include precision agriculture advisory and farmer information services. Precision agriculture advisory can be defined as services that offer information regarding agro-climatic conditions, crop varieties and the economic setting of the farm. This should be distinguished from farmer information services, which are defined as services that provide general advisory information on agronomic best practices within value chains or regions.

Usage

Precision Agriculture Advisory. Paid precision agriculture tools in Haiti are limited to a small number of market actors, as few organizations have the capacity to collect and provide this information or bear the cost. Drones are the most popular precision agriculture advisory method used by agribusinesses and agriculture-oriented organizations engaged as part of this assessment. Drones are used by: 1) FONHDAD, 2) Agriglobal, 3) MIDAS and 4) Sohaderk. All of these organizations use the drone services provided by HDS, except for FONHDAD, which uses its own drones. Drones are used to assess the health of plants, capture information on soil conditions, capture water availability to inform irrigation needs, take accurate plot measurements, facilitate production planning and improve efficiency in plotting lands. HDS

presents its data through a web-based dashboard that can provide clients with plant health indices, predictions on plant yield from counts, and scouting reports that include crop volume, height, soil type and precipitation as well as the progression of field or forest canopies. Acceso uses its Extensio technology to push precision agriculture information to the farmers it works with in the citrus, peanut butter, mango, moringa, castor oil, sisal and moringa value chains and has reached 7,800 Haitian farmers thus far.

Farmer Information Services. Windy is used by MIDAS, an agribusiness specializing in the production of maize, to monitor and predict rainfall to inform when seeds should be planted. In coordination with donor-funded projects, Agriledger works with a content provider, Twilia, to send weather and market insights to farmers through SMS.

Challenges

The use of drones by agriculture-oriented organizations is constrained by cost. Some agribusinesses, like Agriglobal, had to discontinue using HDS due to cost, even though there had been a demonstrable increase in production as a result of using drone services.

The primary barrier to receiving precision agriculture information and farmer information services through SMS, WhatsApp or call centers is SHF mobile device ownership and connectivity. Limited smartphone adoption and low digital literacy among SHFs inhibits farmers' ability to receive more engaging and impactful content through WhatsApp, like video tutorials.

Supply Chain Management

Definition

Digital supply chain management includes services that support actors along the value chain to improve efficiency. This can include farmer databases, traceability and certification solutions, tools that improve logistic coordination and timing, quality assurance for inputs, supply chain enterprise resource planning (ERP) solutions and procurement platforms. In Haiti, the primary sub-use cases adopted include supply chain ERP solutions and traceability and certification solutions.

Usage

Supply Chain ERP. Acceso uses Farmforce to manage a planter network from 40 to 100 planters per depot and to collect data on germination. Acceso's field agents use the Farmforce app to collect basic demographic data on farmers, tag the GPS locations of the farms, track germination success, monitor field activities and collect continuous data on farmer yields and harvests. Farmforce also allows for real time visibility of growing activities by tracking progress along the supply chain through the application. In the case of Acceso, information is collected

and managed by field agents and then visible to Acceso's management team through a web-based dashboard that can provide macro and micro level analysis and visibility on yield and production. Acceso also makes use of the Field Area app to delimit farmer plots. This data is then stored in the mobile and web-based app and transferred to the Farmforce database.

Traceability and Certification. Other agribusinesses, like CASELI, conduct surveys with their farmers by equipping their extension agents with tablets that are preloaded with Google Forms. Agents collect demographic information on farmers including the number of family members, children, assets and other employment activities. Data is then inputted into an Excel database that serves as the farmer database.

Nearly all the agribusinesses engaged use Google Maps to capture the GPS coordinates of farmer plots (save for Acceso which uses Farmforce and Field Area). This information is documented by extension agents and recorded via paper or on the tablet. It's then communicated to the extension agents' supervisors, who add it to the Microsoft Excel database of farmers. WhatsApp is used extensively by agribusinesses and their field staff to communicate site visits, receive quick feedback and to reach farmers directly.

Challenges

Staff training and capacity is one of the common challenges agribusinesses face when adopting digital ecosystem support products. Field staff must be digitally literate and trained on how to collect data through digital applications. Some agribusinesses indicated that errors in data entry caused complications, confusion and accrued costs, requiring field staff to return to reconduct the survey. The other challenge that cuts across all digital agriculture tools is connectivity. Connectivity constraints limit the capacity of field or extension agents to communicate through WhatsApp or capture data through software that require connectivity, like Google Forms.

Finance

Definition

DFS include financial products that are accessible through a mobile device, such as digital payments, savings, financing or insurance. Many of the agribusinesses and financial institutions in Haiti make use of MonCash to distribute payments to farmers, and one uses MonCash to distribute input credit. The primary sub-use cases under finance that are applicable to Haiti's context include payments and credit and loans. Six of the 13 smaller farmer associations engaged as part of this assessment use MonCash to receive payments from buyers that are not within their immediate vicinity, however all payments to farmers are currently made in cash. The associations indicated that farmers express concern around receiving bulk cash payments due

to security risks, however a lack of digital financial literacy and awareness deters them from accepting payments through MonCash.

Usage

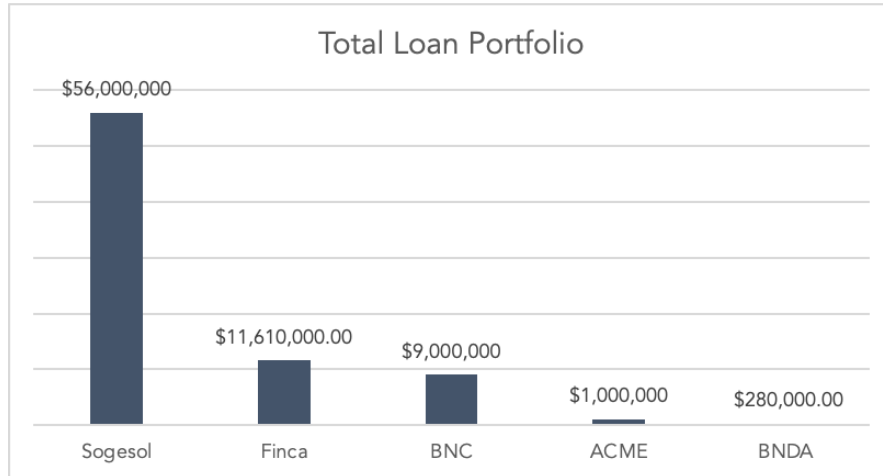
Payments. Use of MonCash is strong among the agribusinesses and smaller farming associations engaged, with five of the larger agribusinesses using MonCash to make payments to their farmers upon receipt of produce. Distribution through MonCash, however, is optional, and most farmers opt to receive payments in cash. Smaller farming associations use MonCash only to receive payments from buyers.

Credits and Loans. Agriglobal distributes input credit through MonCash at the beginning of the harvesting season (if the farmer has a MonCash account). The input cost is deducted from the farmer's final payment at the end of the harvesting season. More commonly, agribusinesses provide farmers with either physical cash or paper vouchers that they can redeem to purchase inputs at eligible input providers.

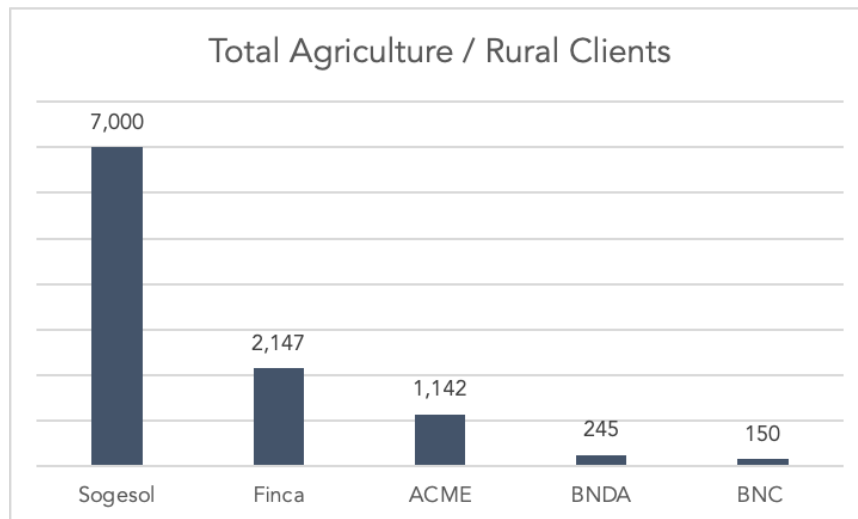
Three MFIs engaged — Sogesol, FINCA and Banque Nationale de Développement Agricole (BNDA) — currently offer roaming agent models where farmers can register and apply for loans with MFI representatives visiting their communities. To document the information, the MFI roaming agents use a tablet with unique, cloud-based applications that are available offline. Action pour la Coopération avec la Micro Entreprise (ACME) is currently piloting a roaming agent model with an Indian technology provider called Shivam.

FINCA is the only MFI engaged that offers a 100% digital credit experience by allowing customers to apply for loans through its website, by application or through a call center. The credit is distributed through MonCash and repayment is also made through MonCash. Besides FINCA, the other MFIs engaged do not distribute loans through MonCash, but do all allow loan repayments through MonCash. Despite the option to repay via MonCash, the potential is limited given the \$750 wallet balance regulatory restriction.

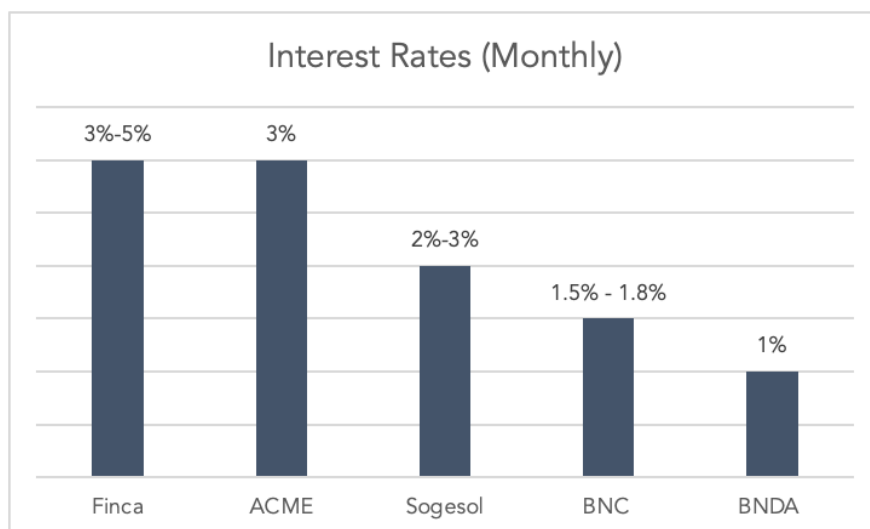
Of the financial institutions engaged, Sogesol has the highest loan portfolio at \$56 million, followed by FINCA at \$11.6 million and BNC at \$9 million.



Of the financial institutions engaged, all except one (BNC), provide financing directly to farmers. Sogesol has the highest number of total agriculture and rural clients, followed by FINCA and BNC.



Loan terms range from 36 months to three months and are centered around the farmers' harvesting cycle. Interest rates range from a high of 5% per month to a low of 1% per month, with BNDA offering the most competitive interest rates compared to the other MFIs engaged in this assessment.



Challenges

Farmers' mistrust in DFS is the main challenge faced by agribusinesses and MFIs in using digital payments. Despite having the option to receive payments via MonCash, many farmers prefer physical cash. The limited prevalence and lack of proximity to CICO agent points also presents a barrier for farmers, who often do not have a convenient opportunity to cash out their funds. Furthermore, merchant ecosystems that accept digital payments (i.e. MonCash) in surrounding farmer communities are weak. This leaves little incentive for farmers to retain funds in the wallet, especially given the limited value added services that can be accessed through MonCash, which does not offer any insurance or credit products.

Mobile money wallet limits of \$750 restrict MFIs in issuing larger loans to their farmer clients. This serves as a disincentive to using MonCash for financing purposes, given MFIs cited confusion among farmers when they did not receive their full loan amount in one tranche, and only exacerbates the existing trust issues with DFS. The 2% cash out fee was also cited by MFIs as a barrier, with farmers perceiving physical cash as less costly than mobile money.

Another barrier to the adoption of DFS is the lack of digital financial literacy and mobile phone adoption, limiting the capacity of agribusinesses to make digital payments to their universe of farmers. In some cases, payments are made to cooperative leaders who then distribute physical cash to their members who do not have an account. Connectivity represents another barrier to widespread adoption given the mobile money USSD menu still requires a minimum and relatively stable network connectivity to operate. The country's fuel crisis, sparked by political turbulence and violence, has only complicated this problem, with fuel shortages leaving 15% of Digicel cell sites offline in late 2021.

Until December 2021, MonCash was the only mobile money player in Haiti. Without competition, there is less of an incentive for MonCash to innovate and create new use cases, especially for the agricultural sector. During engagements with MonCash, it expressed apathy toward innovating for the agricultural sector, indicating that it did not see a value proposition for products like crop insurance and input financing facilitated through its platform. This confirms the broader view of Haiti's technology providers as wary of innovating for the agriculture sector in the absence of donor subsidies. Compared to more advanced mobile money markets, there is a limited number of additional use cases, such as microcredit and insurance, accessible through MonCash.

Conclusion & Recommendations

There is a need to improve the basic foundations required for a digital ecosystem to function and support the use of advanced digital services. Connectivity remains a crucial barrier to digital adoption, with weak coverage in rural areas of the country where farmers live and work. In addition, mobile phone subscriptions are not ubiquitous, with about 36% of Haiti's population without a mobile phone subscription.²⁹ The prevalence and existing use of radio by farmers makes this a compelling channel to deliver farmer information services, especially in collaboration with the existing SIMA initiative championed by the AVANSE project.

The adoption of DFS has been slow, with MonCash being the only primary provider, boasting that it boasts 1.5 million active users in a country of 11.4 million (though this may change with the introduction of NatCash in December 2021).³⁰ SHF mistrust in DFS remains a significant barrier to usage, despite the fact that farmers have the option to receive their payments through MonCash.

The AgTechs and technology providers that also innovate for the agricultural sector are heavily reliant on donor funding, much like Haiti's broader economy. In the absence of a clear business case to support the agricultural sector through digital tools, most companies will only innovate with a guaranteed funding stream. However, despite donor efforts to develop AgTech solutions, most companies struggle to sustain uptake of their applications or software after the project funding period ends. Few agribusinesses in Haiti are willing to expend costs on digital tools that are not deemed urgent. Thus, the role of donors as an early adopter client in Haiti is important if growth or agtech is a priority for the sector. Donor-funded partnerships with digital agriculture services should provide initial seed capital for activities focused on designing go-to-market strategies, segmentation and return on investment projections as a means of providing a roadmap to a diversified set of revenue opportunities. Additionally, donor-funded clients of digital agriculture services can provide onramps and introductions to other customers, even aggregating demand in order to achieve economies of scale, potentially

²⁹ <https://datareportal.com/reports/digital-2021-haiti>.

³⁰ Kill with MonCash.

reducing the cost to clients. Digital agriculture service providers in Haiti will likely always need donor-funded partners as part of their client mix, but USAID investments should always push for customer acquisition of other agricultural value chain partners for longer term sustainability. While overreliance on donor-funded programming can stunt the development of a sustainable business case by digital agriculture providers, it will be crucial to overcome providers' perception of risk and to support market entry and product offerings. With this framing in mind, the recommendations below fall into two segments: 1) supply side and 2) demand side.



Supply Side Recommendations

Recommendation 1: Transition Agriledger to a Sustainable Business Model

Support Agriledger in designing a software as a service (SaaS) business model where users can participate in the system prior to an exchange of funds and pay at the end of the transaction for use of the system.

Why: Currently, Agriledger is one of the few Haitian grown technology companies focusing solely and exclusively on the agricultural sector. Its distributed ledger technology increases profit margins for farmers by giving them a percentage of the final sale price at export in addition to the local market price. However, Agriledger remains reliant on donor funding and is interested in understanding how it can shift to a more sustainable business model.

How: Provide technical support to Agriledger in 1) customer segmentation to better understand who its paying customers could be as well as 2) supporting the development of a SaaS business model.

Who: Agriledger and USAID Implementing Partners (IPs) of ongoing USAID activities.

Relevance: Agriledger's goal is directly aligned with Objective 1 of the HRASA to improve market system efficiency by linking all relevant market actors including smallholder farmers (SHFs), logistics companies and exporters to improve profit margins through distributed ledger technology.

Recommendation 2: Leverage an E-Marketplace for Smaller Farm Associations

Provide technical assistance to support farmer associations in boosting sales through e-commerce.

Why: Smaller farm associations in Haiti lack visibility and online presence needed to attract customers from across the country. They are often limited to buyers they know within their personal networks.

How: Leverage an existing e-commerce platform such as espaceAgro.com or maketpamht.com to link associations with potential buyers. Payment for goods can be made through mobile money or bank transfer. This would involve technical assistance to the associations on digital

literacy and capacity building, marketing their produce effectively on the e-commerce platform and conducting measurement and evaluation for a period of six months to assess its impact.

Who: Partnership with an e-commerce platform, associations and buyers (i.e. supermarkets, wholesalers and Madam Saras).

Relevance: This recommendation directly relates to Objective 1 of the HRASA to increase market system efficiency by better linking value chain actors as well as Objective 2 to increase private sector investment and engagement by creating sustainable linkages between market actors in the value chain.

Recommendation 3: Pilot Solar Powered Cold Storage with a Digital Request and Payment Feature

Pilot solar powered cold storage facilities that farmers can book space for via a USSD menu, SMS or phone call and pay for through mobile money.

Why: One of the biggest constraints to fruits being eligible to export in Haiti is the lack of cold storage, with produce often spoiling before it is exported.

How: Pilot a project in collaboration with a solar company to design innovative and sustainable solutions for solar powered cold storage facilities for tropical fruits. Farmers could make requests to book space at the cold storage facility digitally through SMS, USSD or phone call with daily rates deducted from their mobile money accounts. Alternatively, a mobile financial institution (MFI) could participate in this project under a warehouse receipt system and provide credit to the farmers for the cold storage with repayment made following the sale of produce. Another option could involve a collaboration with Agriledger and an MFI, where repayment for the cold storage is taken out of the farmers' commission on the final export price and Agriledger sends it to the MFI directly.

Who: This pilot could involve an avocado or mango producing association that works directly with SHFs, solar technology providers such as Enersa, Sigora Haiti, Jebtech or Enertex, a partnership with MonCash, NatCash and/or a technology company to create the digital request system and an MFI and/or Agriledger, depending on the preferred method of payment.

Relevance: This relates directly to Objectives 1 and 2 of the HRASA to increase market system efficiency and to increase private sector investment and engagement across market systems. More specifically under Objective 2, it supports the sustainable linkage between market actors including SHFs, logistics companies and exporters to improve the efficiency and profitability of the tropical fruit value chains.



Demand Side Recommendations

Recommendation 1: Support Digital Transformation of Agribusinesses

Support the digital transformation of agribusinesses to respond to the pending U.S. Food and Drug Administration (FDA) rule for the digital tracking and tracing of key imports including tropical fruits and nut butters.

Why: The U.S. FDA is likely to pass a rule in 2022 that aims to standardize the data elements and information that agribusiness companies must establish and maintain to improve the tracking and tracing of food for both domestic and imported produce and products. This law will require maintaining digital records of key data elements associated with critical tracking events along value chains including 1) growing, 2) receiving, 3) transforming, 4) creating and 5) shipping. Included on this list are key exports for Haiti to the U.S. including tropical tree fruits such as mangoes and nut butters. With this new requirement, Haitian agribusinesses must be able to respond to information requests from the FDA within 24 hours. This means that agribusinesses must have the digital capacity to respond to these requests.

How: Matchmake agribusinesses to business development services organizations that expose agribusinesses to digital tools and services that allow for traceability and certification. In addition, provide technical support through an Implementing Partner (IP) to train the agribusinesses' team on how to use the technology and monitor and evaluate their success for six months. Depending on the standards set by FDA, digital solutions that support the digitization process can be as basic as a suite of free cloud-based services such as Google Suite or Office 365.

Who: Business development service organizations that typically work with agribusinesses and USAID activities. Digital services deployment experts from either third party providers or digital traceability service providers themselves (e.g. FarmForce or Agriledger).

Relevance: This relates directly to Objective 1 of HRASA to increase market system efficiency. This initiative can contribute to improving the value of annual sales of producers and firms as well as improving agribusinesses' access to technology.

Recommendation 2: Digitize Value Chain and Digital Financial Literacy Training

Why: MonCash is already used by associations for receiving payments for produce, but it is not being used to pay farmers. Associations indicated that bulk cash payments increase the risk of kidnapping and it would be safer to pay farmers through MonCash or NatCash. However, farmers are hesitant to receive payments digitally, mostly due to mistrust around mobile money. Digitizing farmer payments will reduce security risks for farmers while also supporting the digital record keeping of these smaller associations, which largely remain analog.

How: The best way to introduce new digital solutions is through existing networks of trust. The association management brings strong community relationships with their farmers. A USAID IP could offer technical assistance to guide the associations through the bulk payment process as well as conduct a training of trainers (ToT) for facilitating digital financial literacy. SIA developed

a series of tools for integrating digital financial literacy into FtF programming, which includes rubrics for disseminating digital financial literacy content through trusted community leaders.

Who: Farmer associations (the Haiti Mission has an extensive list of these already) and the SHFs they work with, as well as an IP that can provide ToT support.

Relevance: This recommendation aligns with Objective 3 of HRASA to increase household and community ability to recover from shocks and stresses through a digital financial literacy campaign that can sensitize farmers on savings and access to financial services.

Recommendation 3: Build on Système d'Information sur les Marchés Agricoles/Agricultural Market Information System (SIMA) to Offer Additional Farmer Information Services

USAID's 2013-2020 project, Appui à la Valorisation du Potentiel Agricole du Nord, Pour la Sécurité Économique et Environnementale (AVANSE), included the development of a mobile-based market information system accessible via interactive voice response (IVR), SMS and web platform called SIMA in collaboration with the Ministry of Agriculture, Natural Resources and Rural Development (MARNDR) and Digicel. We recommend building on this existing platform, currently limited to market prices, to also offer weather information. Furthermore, we suggest delivering information through radio as well, which is widely used by farmers and would increase its reach.

Why: Delivering weather predictions to farmers is one of the most commonly cited needs of agriculture associations and agribusinesses. This information can help inform when to sow seeds and when to irrigate. With an increasingly unpredictable climate, having access to good weather forecasts (e.g. on rainfall predictions) is proving essential to maximizing production in Haiti.

How: Build on the existing SIMA initiative to also offer weather information and other extension services to farmers through the existing SMS and IVR channels, and scale to include delivery through radio. This could involve continuing the partnership with the MARNDR and Digicel as well as partnering with FONHDAD or Centre National d'Information Geospatiale (both governmental research agencies) to curate additional content.

Who: Continue AVANSE's partnership with Digicel and MARNDR and partner with local radio stations.

Relevance: This is directly related to Objective 1 under the HRASA to increase market system efficiency by improving access to market-based research and extension as well as information to build a more productive value chain.

Annexes

Annex 1: Database of Stakeholders

#	Date	Organization/Company
1	October 26, 2021	Acceso Peanut Enterprise Corporation
2	December 1, 2021	Action pour la Coopération avec la Micro Entreprise (ACME)
3	October 18, 2021	Agriglobal
4	October 10, 2021	Solutions S.A.
5	December 18, 2021	Banque Nationale de Développement Agricole (BNDA)
6	October 6, 2021	Banque Nationale de Credit (BNC)
7	November 30, 2021	Banque de la République d'Haïti (BRH)
8	October 25, 2021	Candio Michaud & Co. (MIDAS)
9	December 13, 2021	Chemonics
10	October 6, 2021	FINCA
11	October 20, 2021	FONHDAD
12	November 11, 2021	Fonds de Développement Industriel (FDI)
13	October 8, 2021	Haiti Drone Services (HDS)
14	October 15, 2021	Infotronic/AgriLedger
15	December 14, 2021	Papyrus
16	December 20, 2021	PISA S.A.
17	October 20, 2021	CASELI
18	November 4, 2021	Sogebank / Sogesol
19	October 18, 2021	Sohaderk
20	December 23, 2021	Digicel MonCash
21	October 4, 2021	Transversal
22	October 20, 2021	TURBO System
23	October 20, 2021	Wyzdev
24	February 8, 2022	Ferme de Laroché
25	February 8, 2022	Agro industrielle de marmelade

26	February 8, 2022	Agripah
27	February 9, 2022	Choco Criama
28	February 9, 2022	PI Chocoboza
29	February 9, 2022	Choco Gamet
30	February 11, 2022	Action des femmes pour le Développement du Centre
31	February 11, 2022	Florina - Ferme Agricole
32	February 15, 2022	Organization pour la Réhabilitation de l'Environnement
33	February 17, 2022	Oganis Plante St Jean
34	February 17, 2022	Comité d'Appui à la Production Agricole (CAPA)
35	February 15, 2022	Ecobio SA

Annex 2: Relevant Taxonomies by Organization

Use Cases	Sub-Use Cases	Technology Providers									Other donor-funded agriculture programs		
		Extensio	Haiti Drone Services	Agriledger	Windy	Haiti Foundation for Sustainable Agricultural Development (FONHDAD)	Field Area	Farmforce	MonCash	Papyrus	Solutions S.A.	Heifer Foundation	
Advisory	Precision Agriculture Advisory	X	X										
	Farmer Information Services	X		X	X	X							
	Participatory Advisory												
	Farm Management						X						
Market Linkage & E-Commerce	Digitally Enabled Value Chain Integration			X				X				X	
	Mechanization Access Services												
	E-Commerce Services												
	E-Market places												
Supply Chain Management	Traceability and Certification			X							X		
	Logistics												
	Supply Chain ERP Solutions							X					
	Quality Assurance and Counterfeiting												

Finance	Procurement											
	Payments			X					X			X
	Savings											
	Credits and Loans											
	Credit scoring											
	Insurance											
	Financial analytics											
	Crowdfunding											
	FSP digitization											
Ecosystem Support	-			X				X		X	X	X

Annex 3: Key Informant Interview (KII) Question Sets

These are the standard lists of questions asked during interviews. Given limitations around time and varying applicability, the question set was not always followed exactly as it is outlined below.

SUPPLY SIDE QUESTION SET

Introduction to Product

1. Please tell us about the product and the rationale for developing it.
 - a. What are the key challenges this product is trying to overcome?
 - b. Who are the target users, and how did you design for them? (B2B vs. B2C)
 - c. Is it geared toward specific value chains and, if so, which ones?
2. What hardware does the product require? (Tablets, smartphones, basic phones, laptop/desktops)
3. What institutions funded/invested in tool development? What is their current role?

Product Details

4. Does this product integrate with other platforms? (e.g., Whatsapp) Please describe.
5. Please describe the network requirements for the product to function (e.g., offline, 2G)
6. Please tell us about user security on the product.
7. What data is collected, and how is it secured? (e.g. advanced firewalls, intrusion detection, event logging, internal firewalls, encryption)
8. Who owns the data?
9. What customer support features exist? (e.g. call center, in-person field staff)

User Uptake

10. How is the tool rolled out to users?
 - a. Is training needed, and if so, what is the estimated training time/# of sessions needed?
 - b. Do you supply hardware to any users?
11. How many users does it have?
 - a. Active users?
 - b. By type? (i.e. farmer, agribusiness) By gender?
 - c. By region? (If they don't know #s by division, get at least the divisions with active users)
12. Are there specific customer segments your organization is focusing on? Which ones and why?
13. What successes/results has the tool realized? (i.e. in uptake, on agricultural productivity and income)

14. What challenges have you experienced with the rollout of the tool?

Costs and Revenue-Making

15. How do you calculate the revenue the tool brings to your business?

16. What was the tool's total revenue in 2020?

a. If they do not wish to say, can they share if they had net positive revenues, or tell us about how that figure is changing?

17. What is your average revenue per user per year?

a. If they do not wish to say, can they share if they had net positive revenues/user, or tell us about how that figure is changing?

b. Does this number change as you grow?

c. Does it grow large or smaller as your customer base grows, or does it stay the same?

18. What is your customer acquisition cost?

a. If they do not wish to say, what types of costs go into customer acquisition?

19. What are your other ongoing costs, including ongoing customer service costs, per year?

a. If they do not wish to say, what types of ongoing costs do they have?

20. Is your net margin currently positive or negative? Would you be willing to give a range of your net margin?

a. Trying to get to: What is your net margin?

Growth

21. What has growth (# users, revenue) looked like for you over the past several years (up to 3 if available)?

22. Do you have plans to reach more users? Please describe. In your value chains vs. sell the tool to other agribusinesses?

23. How have you developed financial projections for the tool? How do you use them on an ongoing basis?

a. Trying to get to: Do you have an active business plan?

24. Please describe what you see as the Total Addressable Market (TAM) for this tool. What is your target customer mix?

25. How do you segment this TAM for planning purposes?

26. What competitor digital tools are you aware of, if any? How is your product differentiated?

Regulatory Environment

27. Are there specific regulations that present challenges to your service?

Last Thoughts

28. Is there anything else you think we should know? Advice to USAID?

DEMAND SIDE KII QUESTION SET

Background Info

1. Please give us a quick overview of your work. Please cite where you work with women and youth.
2. How many employees do you have?
3. Agribusinesses: What types of financial services do your farmers use? Do you offer any of those services to them (e.g.. credit for inputs)?
4. Have you tried using digital technology before?
 - a. *If no then move to the "Does Not Use Digital Tools/Services" questionnaire*

Description of Digital Services

5. Please tell us about the different digital tools and services your organization uses.
6. How did you hear/learn about the digital services you are using?
7. What factors led your organization to adopt these digital services?
8. Did you ever discontinue using a digital tool or service? If so, what was it and why did you stop using it?

UX/Hardware

9. Can you discuss the user experience of the digital service?
10. What hardware requirements does the digital tool have?
11. Do you find it easy to use? If yes, why; if no, why?

Roll Out and Uptake

12. Can you tell us how you came to start using the digital solution(s)? What problems were you trying to solve?
13. What was the biggest incentive for taking on/transitioning to the use of digital agriculture tools in your work?
14. What was the uptake like within your company? How did you train staff? How did you deal with behavior change issues, if applicable?
15. How would you rate your organization's use of the digital service(s)?

Challenges

16. Beside any challenges you cited before in uptake, have there been other challenges in rolling these digital services out?
 - a. Staff uptake?
 - b. Data Entry?
 - c. Connectivity?
 - d. Cost?
17. How could these challenges best be mitigated?

Benefits

18. What would you say have been the greatest benefits you have gotten from the use of the digital tools? (Ensure we are capturing their thoughts on each digital tool they use)
19. Have these tools helped improve your decision making as a business? If yes, how so?
20. What other benefits do you hope to accomplish from using digital tools?
21. Do you plan to use the digital service long term? Is it part of your company's success now?

Last Thoughts

22. Is there anything else you think we should know? Advice to USAID?
-

FINANCIAL SERVICE PROVIDER QUESTION SET

BANKS / MFIS

Ag Products and Customers

(Examples of ag products: payments, savings, credits and loans, credit scoring, insurance, financial analytics, crowdfunding)

1. What type of product offerings do you have for the agricultural sector? Which of these are delivered or offered digitally?
2. How many customers do you have (by product)?
3. Who are your customers? (i.e. farmers, MSMEs, etc.)
4. Describe your typical loan terms for the agricultural sector (rate, length, fees, collateral).
5. How much is your lending portfolio annually?
6. How many lending customers do you have?
7. How much in deposits do you have from rural customers?
8. Any interest rate given for savings?
9. Number of insurance customers?
10. Total hectares insured (if possible)?
11. Where are the majority of your agriculture customers located?

Service Delivery Challenges

12. Can you speak to some of the challenges you have faced in serving agriculture clients?
13. How do you address these challenges?

Digital Services

14. Do you offer any digital services for the customers we just discussed?
 - a. If yes, please describe your digital services.
 - b. If yes, how do you facilitate the distribution of these services? Do you have an agent network?

- c. If not, please discuss why you have yet to utilize digital services to reach customers.

Lending Data Partnerships

15. What sort of data needs are you missing, or do many potential customers not have when making lending decisions?
16. Do you ever utilize third party data for lending decisions?
 - a. If not, why not?
 - b. If not, would you consider it? If yes, then what information would you need to make an informed decision?
 - c. If yes, who are your third party partners?
 - d. If yes, what sort of data sharing frameworks do you use?
 - e. If yes, what sort of data are you leveraging?
 - f. If yes, How are you leveraging the data?
 - g. If yes, what is the commercial agreement to use the data?

MOBILE NETWORK OPERATORS

1. Can you share any type of connectivity map that shows where your network reaches?
2. What % of the population do you cover with 2G?
3. What % of the population do you cover with 3G?
4. What % of the population do you cover with 4G?
5. How many airtime distributors do you have?
6. Data costs (we can likely get a hold of these from public sources)
7. Key challenges in serving more rural customers

General Agriculture Services

8. Do you have any agriculture specific offerings?
 - a. If yes, what are they, how many customers, etc.
 - b. If not, why not?

Mobile Money

9. How many active customers (30 day) do you have?
10. Does your mobile money wallet have any agriculture specific services integrated with it?
11. Do you have any agriculture specific services through your mobile wallet?
12. How many active agents do you have? Do you have a breakdown of their locations? % in urban areas?
13. What is the volume and value of funds your platform processes on average monthly?
14. Do you have any products that work specifically with rural savings groups?